Proposed Standard Title:
Series of standards for the discovery and management of digital twins for built environments

Proposed Scope:
This proposed series of standards aims to specify minimum requirements for the discovery and management activities for context-rich, digital representations of built environments (i.e. Digital Twin). Considerations are given to: • Discovery, collection, and organization of information on <u>different subsystems and protocols</u> (e.g. BACnet or telnet) used to discover and define built environments. • Discovery, documentation, and maintenance of a master set of relevant <u>location mappings</u> of a given built environment (incl. association of physical assets to a specific location). • Cross-application interactions relating to handling of events and routing of notifications for <u>context-specific notification management</u> and control. • Shared services model for <u>storing, retrieving, manipulating, persisting and auditing data</u>, with the goal to abstract provided Digital Twin solutions from the various sources of data. • Shared contextual system that allows <u>different subsystems to communicate</u> with each other in one common system <u>with a coherent representation of an entity</u> (e.g. person, subsystem unit) regardless from which system the data comes from. • Thresholds for <u>measurement and verification of technology performance indicators</u> against a set of criteria related to urban innovation use cases. (e.g. energy conservation, user experience, safety).

Strategic Need:
Identify the strategic need of key stakeholders and confirmation expressing the need. *This includes consideration for:* *a. The strategic need of key stakeholder (e.g. legislator, industry, government, consumers);* *b. The type of standard (international, regional, domestic standards and harmonization need);* *c. Addressing up-to-date vs outdated standard to ensure latest innovative/technology/safety features available for businesses;* *d. If the standard is intended to support national/regional/international certification programs;* *e. If there is stakeholder intention to transition to different standard;* *f. The type of maintenance (periodic, continuous, stabilized, best before date); and* *g. The use of "CAN" descriptor.*

In 2019, the global Digital Twin Market was valued at $3.8 billion USD, with the expectation to grow aggressively to $35.8 billion USD by 2025. Gartner predicted in 2017 that by 2021, 50% of large industrial companies will make use of some form of a Digital Twin, leading to a 10% improvement in overall effectiveness. This shows in an impressive manner, that a Digital Twin is not simply a digital mock-up of the physical environment, but a highly valuable contextual model of an entire organization and its operation. It's the data from subsystems and the real-time interaction between people, process and technology in various forms. The challenge in these environments has been distilling, orchestrating, and operationalizing that data and making it ready for use by human and computer consumers for predictive modeling or automation of tasks. When fully operationalized, Digital Twins combine real-time data from IT and OT systems, IoT sensors and third-party data in a contextual representation of a built environment – they don't just collect data but put it to use for the benefit of the tenant, operator, or owner.

Canada has a large variety of companies that work within the wider sphere of Digital Twins and digitalization and have the expertise, talent, and capabilities to rapidly commercialize and scale their solutions. In order to support these Canadian technology companies in their pursuit, standards and shared guidelines are crucial to increase the competitive advantage. Furthermore, international standards for the discovery and management of Digital Twins of built environments would drive economic development through increased interoperability, collaboration and accelerated commercialization. Ultimately, the proposed standards would lead to better outcomes for all parties involved, whether that is the end user, owner/operator of buildings, industry, or the municipality/government.

Need for Availability in Both of Canada's Official Languages:	YES
Do stakeholders need the standard published in both official languages? *Do users of the standard need the standard published in both official languages?* *Do authorities having jurisdiction need the standard published in both official languages?* *Are there health and safety related needs for the standard to be published in both official languages?* *For adoptions, is there availability of the regional/international standard or other deliverable from the source?* *For adoptions, is there an agreement with the source committee to facilitate official translation?*	

Geographical Representation Considerations:

Identify the Canadian geographical representation appropriate to the subject area covered by the standard.

Geographic representation may consider factors such as:
  a. *Industry (e.g. petroleum in petroleum producing provinces);*
  b. *Reference in regulation (if a regulation exists in a province); or*
  c. *Commodity characteristics and social impact (e.g. heating oil for northern climates).*

The proposed series of standards are not limited to a specific industry or sector of the economy, as built environments exist across all industries and by consequence Digital Twins can be deployed in any industry.

Trade:

Identify how the standard meets the needs of the marketplace and contributes to advancing trade in the broadest possible geographical and economic contexts.

For example:
    a.   *Facilitate Canadian innovation to lead internationally;*
    b.   *Support the objectives of "One standard, one test, accepted everywhere";*
    c.   *Support the objectives of "First to Market"; or*
    d.   *Foster international/ regional/ national alignment of requirements.*

Estimates by the UN indicate that by 2050, two-thirds of the world's total population will be living in cities. Due to these urbanization trends, cities across the globe are faced with the challenge to balance technological advances, increased infrastructure demand, economic factors, and the well-being of their citizens. Canadian cities are equally in need of innovative approaches that drive economic development and prosperity for the community. The Toronto-Waterloo corridor is home to a large variety of technology companies that hold the potential to address these resiliency challenges and pursue the opportunity to position Canada as the global leader in smart city innovation.

Considering the strong trend indicated above, a standardized approach to creating, managing and sustaining a smart, Digital Twin of a built environment is crucial to ensure high efficiency and interoperability between built environments as individual components within the network of a Smart City. A set of common practices relating to discovery and runtime management of built environments and subsystems, enables increased, shared insight into building operations and allows for simpler collaboration with other companies and components of built environments. Additionally, multiple benefits relating to safety, sustainability, and efficiency for everyone from the tenant to the owner of a built environment will become available. This shared understanding of a preferred process not only allows for faster commercialization of new technologies and services, but further accelerates global adoption, thereby providing the basis for a universal, international standard for discovery and management of a Digital Twin of built environments.

Relevant existing documents at the international, regional and national level:

ISO/CD 23247-1, Digital Twin manufacturing framework — Part 1: Overview and general principles

ISO/TS 18101-1:2019, Automation systems and integration — Oil and gas interoperability — Part 1: Overview and fundamental principles

ISO 15704:2019, Enterprise modelling and architecture — Requirements for enterprise-referencing architectures and methodologies

ISO/IEC 30146:2019, Information technology — Smart city ICT indicators

ISO 14033:2019, Environmental management — Quantitative environmental information — Guidelines and examples